K34 Analyzing Cannabiniods by HPLC/MS/MS

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After attending this presentation, attendees will understand how to increase sample throughput using HPLC/MS/MS methodology and how to chose the proper method conditions to obtain reliable, enhanced sensitivity for cannabinoid analysis.

The HPLC methodology discussed will impact the forensic science community by providing an alternate means of analyzing cannabinoids at low concentrations compared to the current GC methodology.

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This study included developing an HPLC/MS/MS method for analyzing cannabinoids. The main psychoactive component in marijuana, Δ^9 – tetrahydrocannabinol (Δ^9–THC), is quickly absorbed and metabolized to 11-hydroxy-Δ^9-tetrahydrocannabinol (hydroxy-THC), an active metabolite. The hydroxy-THC is further metabolized (rapidly) to 11-nor-9- carboxy-Δ^9-tetrahydrocannabinol (carboxy-THC), an inactive metabolite commonly found in urine, blood, hair, and other tissues. GC-MS (Gas Chromatography-Mass Spectrometry) often is used for confirming and quantifying Δ^9–THC and carboxy-THC. However, GC-MS methods require time-consuming steps like derivatization to obtain acceptable chromatography. Using HPLC (High Performance Liqui Chromatography), derivatization is eliminated, saving time without sacrificing sensitivity.

A quantitative method for analyzing underivatized cannabinoids by HPLC tandem mass spectrometry was developed. Goals were threefold in this study; 1) to optimize the column selection, 2) to provide a short analysis time and, 3) to obtain reliable confirmation and quantitation data in the low ng range (< 10ng).

Results showed that choosing a column that produced longer retention allowed for the use of a high organic mobile phase composition. This high organic mobile phase composition increased desolvation efficiency and enhanced sensitivity of the cannabinoids. Detection at the picogram level was obtained. The high organic mobile phase composition also contributed to a short analysis time of 5 minutes. The use of the MS/MS instrumenta- tion produced reliable identification by producing two +MRM transitions.

Based on the work described above, a biphenyl HPLC column coupled to an HPLC MS/MS can quantify low levels of analyte from underivatized sample – and can achieve baseline separation of Δ^9-THC and cannabidiol (which have very similar product ion spectra and +MRM transitions) – in less than 5 minutes.

Mass Spectrometry, HPLC, THC

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